REMARKS/ARGUMENTS

General Remarks

Amended claim 17 corresponds to former claim 17, wherein reference to the reduced moisture uptake and improved oxidation protection has been incorporated. Furthermore, it is clarified that the composition is for use as a sinter additive. Support for these amendments can be found throughout the whole description, e.g. on page 4, lines 18 to 25 and example 1. The reference to a wax has been deleted in the amended claim 17.

Amended claim 32 corresponds to former claim 32, wherein the term "wax" has been deleted.

Amended claim 53 corresponds to former claim 53, wherein the phrase "wherein the manganese sulfide is coated prior to addition of a selected" has been replaced by "and a metal powder, wherein the manganese sulfide is treated with the surface coat prior to addition to the". Support for this amendment can be found in the description on page 7, lines 11 to 14. It should be furthermore pointed out that it should be clear in view of the disclosure of page 7 and previous claim 53 that the sinter powder is a mixture of the sinter additive and a selected metal powder which is the main part of the mixture as can be seen from the first paragraph of page 7. Furthermore, the dependency of claim 53 has been amended to be in line with the dependencies of the former claims.

Former claims 18 to 31, 33 to 52, 54 and 55 remain unchanged.

Rejection under 35 USC § 112 (first paragraph)

The Examiner previously alleged that claims 53-55 lacked sufficient description were therefore not enabled. The applicant respectfully disagrees. Amended claim 53 is fully supported by the description on page 7, lines 11 to 14. In fact, claim 53 claims a preferred embodiment of the invention, *i.e.*, that the manganese sulfide powder is coated prior to the addition to the selected metal powder to obtain the superior properties of the manganese powder as disclosed on page 2, lines 32 to 36 of the description. Therefore, the rejection under 35 USC § 112 (first paragraph) should be withdrawn.

Rejection under 35 USC § 112 (second paragraph)

The examiner also previously held that claims 53-55 would be indefinite for failing to particularly point out and distinctly claim the subject matter which is regarded as the invention as it would be unclear if a selected metal powder must be added.

According to the present invention, the surface coated powdered manganese sulfide is used as an sinter additive in a sinter process. The sinter powder used in such sinter process contains at least the sinter additive and a selected (base) metal powder, wherein the base metal powder is present in an amount of about 99.9 to 99.0 wt.% (cf. page 6, line 37 to page 7, line 5). This close connection is clear to the skilled man in the art. Claim 53 is directed to a sinter powder comprising the surface coated powdered manganese sulfide according to any one of claims 17 to 31 and a selected metal powder. The second part of the claim discloses that the manganese sulfide is treated with the inventive coating agents prior to the addition to said selected metal powder.

In view of the above mentioned disclosure of the description, the subject matter of claim 53 is clear and precise in that one selected metal powder must be combined with the sinter additive to form the sinter powder which is then sintered to obtain the desired mold product.

Rejections under 35 USC § 102(b)

Claim 55 was further previously rejected under 35 USC 102(b) as being anticipated by Uenosono (US 5,938,814), in particular in column 13, lines 39 to 44.

First of all, a short summary of the subject matter of the present invention will be given below to support the following argumentation and to facilitate proper examination.

The present invention is directed to a storable and easily obtainable manganese sulfide for the use as a sinter additive. The problem associated with manganese sulfide is its reaction with moist air to MnO, MnO2 and MnSO4 and thereby causing a clumping together to larger particles or agglomerates. This partial oxidation of the MnS to MnO, MnO2 and MnSO4 leads to a structural weakening of the finished molded articles. Therefore, the present invention provides a surface coated manganese sulfide, which is coated with a coating agent as claimed in amended claim 17 to prevent oxidation of the MnS particles and to prevent moisture uptake and the agglomeration resulting therefrom. The ensure that the manganese sulfide maintains its properties during storage, the coating has to be applied before the mixing of the manganese sulfide with the base metal powder. Thereby, the coating does not serve as a further additive in the sintering process but only serves to enhance the properties of the used manganese sulfide.

As already mentioned in the last reply to the USPTO, Applicant agrees that the preparation of sintered articles using MnS powder as a sinter additive is known in the prior art, as MnS has proved to be an especially suitable additive for sintering. Concerning the above

allegation, Applicant also agrees to the evaluation of the examiner that a product-by-process claim is only new if the product itself is new and unobvious.

However, those requirements apply to the molded article manufactured by the method of the present invention. The molded article as claimed in claim 55 is prepared using the sinter powder including the inventive surface coated powdered manganese sulfide as sinter additive as claimed in claim 53. Due to the coating, the inventive manganese sulfide has a better oxidation protection and a reduced moisture uptake and therefore improved properties as sinter additive. The machinability and sliding properties of the sintered material depends on the pureness of the MnS. As a consequence, the molded article prepared with the inventive coated MnS which, due to its coating, shows improved properties as a sinter additive compared to the MnS sinter additives of the prior art, also has improved properties compared to molded articles of the prior art, e.g. the structural weakening of the finished molded articles is decreased. Such improvement can not be obtained using the uncoated sinter additive of Uenosono. Therefore, the product claimed in claim 55 is new over Uenosono as the process by which it is prepared is improved and therefore a new and improved molded article is obtained.

Furthermore, the Examiner states that the subject matter of claims 17-55 is not new over Storstrom (US 5,480,469). Again, the applicant disagrees.

Storstrom relates to a powder mixture and a method for the production thereof. In particular, the problem to be solved by Storstrom is that segregation occurs during the transport and the handling of the powder composition and that the flowing properties of the composition is impaired due to the differences in the particle sizes of the composition which is due to the agglomerates formed by moist air as explained above. As a consequence, the filling of the dies with powder takes longer and no homogenous composition with an uniform density is obtained leading to lower productivity and an increased risk of variations in density in the compacted components as well as to unacceptable deformations after sintering.

Therefore, Storstrom discloses a powder metallurgical mixture with a base metal, pulverulent additives and a binder, wherein said binder is a diamide wax, i.e. the diamide wax of Storstrom is used as a binder for binding together the powder particles of the additives with the powder particles of the base metal (cf. column 3, lines 39 to 62). It is necessary that the binder is homogeneous distributed between the base metal powder and the additives to form the sinter powder as a homogeneous mixture to avoid the above mentioned disadvantages of the prior art

(cf. column 5, lines 37 to 43 and Table 1 of the example). This sinter powder mixture is a compact mass wherein all particles are "bound" together, i.e. the dusting of the sinter powder (the mixture of base metal powder, additives, lubricant and binder) is highly decreased (cf. Table 1 of Storstrom).

However, the coating of the present invention is not used to prepare a homogeneous mixture of the sinter additive and the base metal, i.e. to prepare a homogenously mixed sinter powder, but to protect the sinter additive against oxidation and agglomeration due to moisture uptake. The inventive surface coated manganese sulfide can be stored and used without further treatment and without loosing its machine processing properties. Furthermore, with respect to the sinter powder, the base metal powder and the sinter additive, i.e. the surface coated manganese sulfide, are present as separate particles which are not bound together by any binder. This is not intended by Storstrom. Actually, Storstrom is totally silent about coating sinter additive particles for oxidation protection or prevention of moisture uptake.

In this respect, the examiner states that the same material can act as binder as well as a coating agent. Although it is possible that the same material can be used as a binder and a coating agent, Applicant is of the opinion that the terms "binder" and "coating agent" describe a purpose of use rather than a chemical composition. If a material is used as a coating agent, it is used to apply a material on a single substrate to modify the surface of the substrate leading to different or improved properties of said substrate. The coated particles of the substrate are still independently moveable from each other. In contrast, if a material is used as a binder, the purpose is to bind together discrete and individual particles in a composition in one shared or common matrix. The bound particles can only be moved as one single mass, i.e. not independently from each other. Although a material can be used as a binder and a coating agent, it is referred to depending on the purpose of use. Both terms describe a precise process rather than a condition. Accordingly, the teachings of Storstrom and of the present invention are totally different.

The subject matter of new claim 17 is directed to a surface coated powdered manganese sulfide. The superior properties of the inventive coating of the powdered manganese sulfide particles are inter alia that the surface coated manganese sulfide has an improved oxidation protection and shows a reduced moisture uptake. These properties are totally independent from any sinter powder or sintering process. This is supported e.g. by example 1 of the present

application. The feature of a surface coated manganese sulfide is not mentioned in Storstrom. In view of the above comments, claims 17 to 31, and consequently claims 32 to 52 are new over Storstrom.

Regarding claim 53, Applicant does not understand the statement of the examiner concerning "uranium powder" on page 3 of the office action. The examiner states that claim 53 does not require the addition of uranium as a selected powder, so Storstrom does not need to teach the addition of uranium or other metal powders.

Besides the fact that uranium is not mentioned in the present application or in the Storstrom reference at all, the examiner is drawn to the fact that the sinter powder as claimed in claim 53 comprises the surface coated powdered manganese sulfide and a selected metal powder, wherein the manganese sulfide is treated with the inventive coating agents prior to the addition to said selected metal powder. As already mentioned above, the coated powdered manganese sulfide of the present invention is new over Storstrom and therefore claim 53 and dependent claims 54 and 55 are also new over Storstrom. In addition, it is explicitly mentioned in column 5, lines 11 to 22 of Storstrom, that the binder is added to the mixture of the base metal and the additive after a mixture of the base metal and the additive has been built or that the binder is added at the same time into the mixing vessel as the base metal and the additive, thus forming a homogeneous and compact sinter powder. This is also supported by the example of Storstrom. In column 6, lines 4 to 23, it can be learned that (all) the components of the mixture are mixed together in one reaction vessel. Contrary, the powdered manganese sulfide of the present invention is coated prior to the addition to the selected metal powder. In this respect, it has to be said that the coating agent as such is of less importance for the sinter powder, the sinter process and the molded articles, it only serves to protect the manganese sulfide against oxidation and moisture uptake whereas the binder of Storstrom is absolutely necessary for the sinter powder, the sinter process and the molded articles. As to the product-by-process claim 55, the same applies as already mentioned above. Therefore, claims 53 to 55 are novel over Storstrom.

Rejection under 35 USC § 103

The Examiner is still of the opinion that the subject matter of claims 17 to 55 lacks an inventive step over Chopra (US 5,768,678) and Grady (US 6,287,513).

Applicant respectfully disagrees as the applicant is of the opinion that the teachings of Chopra and Grady provide no indication of a coated manganese sulfide powder used as a sinter

additive. The Examiner states that the combination of Chopra and Grady is of course appropriate and obvious. However, the skilled man in the art faced with the problem of improving the oxidation protection and the protection against moisture uptake in manganese sulfide used as a sinter additive would not combine the teachings of Chopra and Grady as there is no hint that such combination could lead to an improved sinter additive with the aforementioned properties, according to this side's point of view.

The problem to be solved by the present invention can be seen as the provision of a manganese sulfide which shows improved oxidation protection and protection against moisture uptake.

Chopra deals with a process of making manganese sulfide in which the yield is improved, which provides a mechanism to moderate and cool the highly exothermic reaction between manganese and sulfur and which provides enhanced machinability of a powder metal part. This is done by reacting a mixture of manganese, sulfur and iron. In this reaction, iron is used in an amount of up to 8 wt.% in the reaction mixture. As a side effect of the disclosed process, the iron in the prepared MnS composition provides against oxidation by moisture. Therefore, the teaching of Chopra might be seen as the closest prior art wherein the sinter additive suffers from containing additional useless iron sulfide and a surface reaction can be merely reduced but not avoided. A further disadvantage of this sinter additive is its costly production.

However, Chopra is totally silent with respect to a coating of the manganese sulfide as the solution of the posed problem. The examiner is of the opinion that example 18 of Chopra discloses a sinterable mixture blend comprising MnS and a binder which can be compared to the inventive solution of the present application. However, the binder in example 18 is used in the blend comprising the metal powder, lubricants, a sintering enhancing additive and the MnS to form a homogenous mixture of the ingredients in the blend, similarly to Storstrom. In no word it is disclosed, that the said binder can be used for coating only MnS prior to the addition to the metal powder and further additives to provide protection against oxidation and moisture uptake for the MnS.

In this respect, the examiner is drawn to the above explained difference between a binder and a coating agent. The skilled man faced with the problem of preparing a MnS sinter additive with improved oxidation protection and reduced moisture uptake is in no way directed to the solution of the present invention by the teaching of Chopra. Instead of, Chopra is only discussing

the problem of preparation of MnS (cf. Examples 1 to 17!). In a subordinate clause in Example 18, a "binder" is mentioned without any relevance for coating MnS. Actually, it appears that the Examiner has carried out an a posteriori interpretation of a passage of Chopra, which still has no relevance or indication for the inventive solution having the solution of the present invention in mind.

Despite the lack of any hint in Chopra concerning the subject matter of the present invention, the examiner is of the opinion that the combination of the teachings of Chopra and Grady would inevitably lead to the claimed invention of the present application.

Grady deals with the preparation of higher density powder metal parts. In column 5, lines 27 to 29 it is stated, that the compacted powder metal products are formed of small iron or iron alloy particles, mixed with suitable thermoplastic binders and molding lubricants. In particular, it is disclosed that the iron particles can previously be coated with said fugitive (thermoplastic) binder (cf. column 5, lines 49 to 53). There is no indication that any sinter additive is used either, nor that any sinter additive can be coated as claimed in the present invention. Actually, the thermoplastic of Grady is used to coat the base metal powder, i.e. the iron particles of the blend. As states in column 6, lines 5 to 9, the thermoplastic operates as a lubricant and serves to increase the density of the molded base/tooth and acts as a binder and serves to hold the particles together in the as-molded, "green" state. Again, no MnS is mentioned and no use of the binder as coating agent for oxidation protection or reducing of moisture uptake is disclosed. In this respect, the Examiner is drawn to the difference of a "binder" and a "coating agent" as explained in our last reply to the USPTO and as explained above.

Further it is described, that in the preparation of a magnetizable molded article ferromagnetic particles are coated with a soluble polymer binder which serves to adhere or "glue" insoluble polymer particles onto the surfaces of the ferromagnetic particles, wherein said insoluble polymer can be e.g. a polyamide or a fluorocarbon. The insoluble polymer particles are used to insulate the metal particles throughout the molding and to insure a substantially uniform distribution of the particles in the mold (cf. column 6, lines 10 to 45). Also, in this embodiment, the use of the thermoplastic binder of Grady is totally different to the use of the coating agent in the present invention. On the one hand, the thermoplastic is used to bind the particles together while on the other hand it is used to separate the particles. Throughout the whole specification a

surface coated sinter additive used for oxidation protection and prevention of moisture uptake can not be found. Therefore, the teaching of Grady is of no relevance for the present invention.

In particular, the Examiner states that the term "binder" in example 18 of Chopra and the teaching of Grady obviously and inevitably leads to the subject matter of the present invention.

The applicant kindly disagrees to this statement of the Examiner. The applicant is of the opinion that there is no hint to combine the teachings of Chopra and Grady at all, and the combination of the "binder" of Chopra and the "binder" of Grady is mere speculation. Both documents deal with totally different subject matters. While Chopra discloses the improved preparation of MnS, Grady deals with the preparation of higher density powder metal parts. Starting from these two distinct starting points, the skilled man would not combine these two teachings for any reason. Nevertheless, when searching for a solution of the posed problem of the present application, Chopra and Grady are totally silent with regard to a surface coated manganese sulfide. While Chopra discusses an improved process for the preparation of MnS, Grady is totally silent with regard to MnS. Furthermore, the binder in Grady combined with the binder of Chopra could not lead to a surface coated manganese sulfide.

Furthermore, the examiner states that claim 53 does not require if the coating had to be applied before the use of the MnS as an additive and that there is no indication that the term "is coated" refers to the coating agent of claim 17.

First of all, when reading the claim, it should be clear to the skilled man in the art that the sinter powder is comprised of a selected base metal powder and the sinter additive. Said sinter additive is the surface coated manganese sulfide according to claims 17 to 31, which has to be coated prior to the addition to the selected base metal powder. When coated and added to said selected base metal powder, the sinter powder is built, ready for the sintering process as described in claim 54. According to the claim, it is absolutely necessary to coat the manganese sulfide prior to the addition to the selected base metal powder thereby leading to the improved properties of the sinter additive concerning oxidation protection and reduced moisture uptake.

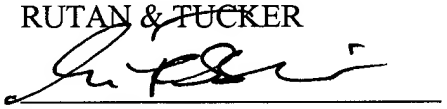
Further, the Examiner states that it is not clear if there can be another coating that is completely removed prior to the addition to the selected metal powder. Again, the applicant kindly disagrees. There is no such indication in the claim or anywhere in the specification that any other coating is applied to the manganese sulfide than the coating as claimed in claims 17 to 31. The manganese sulfide is coated with a coating agent as claimed in claims 17 to 31 and

added to the selected base metal powder to form the sinter powder. No further interpretation of the claim is possible. In addition, such sinter powder can not be obtained by the teachings of Chopra and Grady for the reasons already mentioned above, as no sinter additive in the form of a coated manganese sulfide having superior properties due to improved oxidation protection and reduced moisture uptake is mentioned therein.

The applicant believes that the present claim amendments are sufficient to overcome the Examiner's concerns and believes that the claims as amended are now in condition for allowance. Therefore, the applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

RUTAN & TUCKER



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